



Swaps Revisited

Chapter 32

Valuation of Swaps

- The standard approach is to assume that forward rates will be realized
- This works for plain vanilla interest rate and plain vanilla currency swaps, but does not necessarily work for non-standard swaps

Variations on Vanilla Interest Rate Swaps

- Principal different on two sides
- Payment frequency different on two sides
- Can be floating-for-floating instead of floating-for-fixed
- It is still correct to assume that forward rates are realized
- How should a swap exchanging the 3-month LIBOR for 3-month CP rate be valued?

Compounding Swaps (Business Snapshot 32.2, page 731)

- Interest is compounded instead of being paid
- Example: the fixed side is 6% compounded forward at 6.3% while the floating side is LIBOR plus 20 bps compounded forward at LIBOR plus 10 bps.
- This type of compounding swap can be valued using the “assume forward rates are realized” rule.

Currency Swaps

- Standard currency swaps can be valued using the “assume forward LIBOR rate are realized” rule.
- Sometimes banks make a small adjustment because LIBOR in currency A is exchanged for LIBOR plus a spread in currency B

More Complex Swaps

- LIBOR-in-arrears swaps
- CMS and CMT swaps
- Differential swaps

These cannot be accurately valued by assuming that forward rates will be realized

LIBOR-in Arrears Swap

(Equation 32.1, page 733)

- Rate is observed at time t_i and paid at time t_i rather than time t_{i+1}
- It is necessary to make a convexity adjustment to each forward rate underlying the swap
- Suppose that F_i is the forward rate between time t_i and t_{i+1} and σ_i is its volatility
- We should increase F_i by $\frac{F_i^2(\tau_{i+1} - t_i)t_i}{1 + F_i\tau_i}$

when valuing a LIBOR-in-arrears swap

CMS swaps

- Swap rate observed at time t_i is paid at time t_{i+1}
- We must
 - make a convexity adjustment because payments are swap rates (= yield on a par yield bond)
 - Make a timing adjustment because payments are made at time t_{i+1} not t_i
- See equation 32.2 on page 734

Differential Swaps

- Rate is observed in currency Y and applied to a principal in currency X
- We must make a quanto adjustment to the rate
- See equation 32.3 on page 736.

Equity Swaps (page 736-737)

- Total return on an equity index is exchanged periodically for a fixed or floating return
- When the return on an equity index is exchanged for LIBOR the value of the swap is always zero immediately after a payment. This can be used to value the swap at other times.

Swaps with Embedded Options (page 737-740)

- Accrual swaps
- Cancelable swaps
- Cancelable compounding swaps

Other Swaps (page 740-741)

- Indexed principal swap
- Commodity swap
- Volatility swap
- Bizarre deals (for example, the P&G 5/30 swap in Business Snapshot 32.4 on page 741)